PROGRAM AND PROJECT MANAGEMENT GUIDE for the SOILS PROGRAM AREA

A Guide for the Implementation of Program and Project Management

First Working Draft

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NEW YORK STATE DEPARTMENT OF TRANSPORTATION

TECHNICAL SERVICES DIVISION

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I. INTRODUCTION

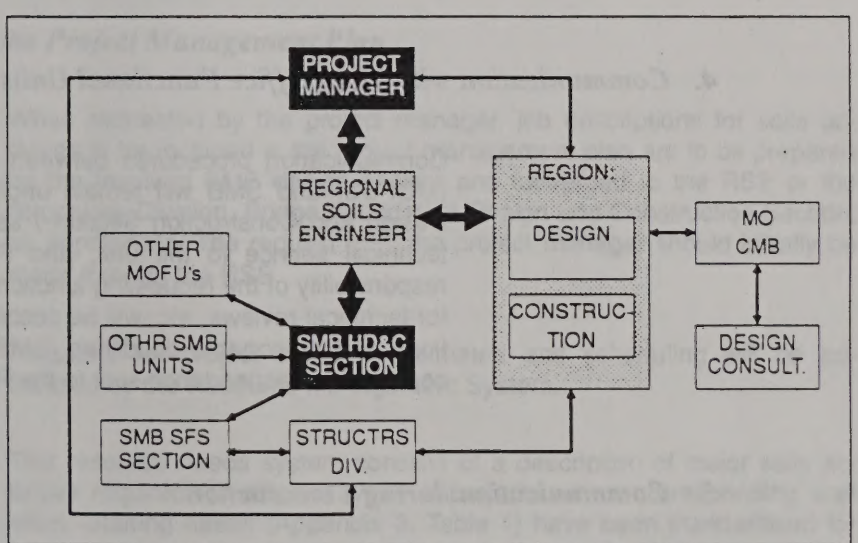
This guide will provide project managers, Regional Soils Engineers (RSE) and Soil Mechanics Bureau (SMB) staff with information on soils program activities as they relate to the new project management system. It will also formalize channels of communication. Most of these procedures are not new and will not change other than incorporating the project manager. New procedures will be explained in **Part V: New Procedures to Accommodate Project Management** of this Guide.

II. COMMUNICATION PROCEDURES

1. Communication Focal Points

The figure below depicts the Soils program project communication model. The heavyweight arrows depict the primary communication route. The lightweight arrow depict secondary or follow-up routes. When communication is initiated via the secondary route, appropriate groups in the primary route shall be informed immediately.

MODEL FOR SOILS PROGRAM COMMUNICATION



2. Communication with the Region

The RSE is the communication focal point for all soils-related matters dealing with the Region. Project managers, Regional Design Engineers, Regional Construction Engineers, EIC's and Regional Technical Services

Engineers are to contact the RSE for information on soils-related costs, scope and scheduling estimates and details on all projects requiring soils involvement.

When necessary, the RSE will contact the appropriate Area Soils Engineer (ASE) in the Highway Design and Construction (HD&C) Section of the SMB to transmit information and requests to SMB section heads. Communications from the SMB will be forwarded to the region through HD&C and the RSE for transmittal to the appropriate project manager or other regional personnel.

After the initial contact is made, communication between the Region Design Group and the SMB can be direct, with copies of correspondence sent to the RSE and the project manager. This arrangement is made at the discretion of the RSE.

3. *Communication with Structures Design and Construction Division*

Communication between the Main Office Structures Design and Construction Division (Structures Division) and SMB on projects when soils activities are a sub-task to the structure design will be from the Structure Foundation Section of SMB through the Bridge Foundations and Construction Section of the Structures Division. Communication with the project manager will be the responsibility of the Structures Division.

4. *Communication with Main Office Functional Units*

Communication procedures between other main office functional units (MOFU's) and SMB will remain unchanged (i.e. through the Highway Design and Construction Section) as in these cases SMB performs a technical service to the unit, and PPM related activities remain the responsibility of the requesting functional unit. It is expected that requests for technical reviews, etc. will be accompanied by specific review instructions and reasonable deadlines. SMB will respond to the MOFU, with copies of correspondence sent to the RSE and the project manager.

5. *Communication during Construction*

Procedures for communication during construction will remain unchanged, being handled from the HD&C Section through the RSE. Site specific structure foundation field evaluation questions will be relayed directly to the Structures Division, Bridge Foundations and Construction Section.

6. Communication with the Project Manager

It is important that the project manager be kept informed of activity and correspondence regarding the project. The project manager, however, is not interested in design details, but rather issues that affect the cost, scope or schedule of the project. Therefore, the project manager should be copied on all correspondence dealing with cost, scope or schedule. The discretion of the writer of the correspondence must ultimately be used when deciding if the project manager should receive a copy. When in doubt, send a copy.

III. DEVELOPING CSSQ AGREEMENTS

1. Input to Project Scope and Preparation of the Expanded Project Proposal (EPP)

The RSE is responsible for identifying projects with soils involvement and ensuring soils issues are properly addressed during project scoping. The RSE is to be included in project scoping meetings for projects having soils involvement. The RSE is also to be included in circulations of draft EPP's for review and comment on soils-related issues, and is the contact person for Cost, Schedule, Scope, Quality (CSSQ) negotiations.

2. Development of the Project Management Plan

When requested by the project manager, job descriptions for soils activities to be included in the project management plan are to be prepared by the involved SMB design section and forwarded to the RSE or the Structures Division, Bridge Foundation Design and Construction Section, as appropriate. The request from the project manager should initially be made through the RSE.

Requests for project resource estimates and scheduling will be addressed by the Resource Management System.

This resource needs system consists of a description of major soils activities required for different types of projects with a corresponding staff effort. Staffing needs (Appendix 3, Table 1) have been standardized for most of these soil activities as a preliminary guideline for scheduling. Projects requiring major soils involvement will necessitate detailed staffing estimates by the SMB.

A procedure (Appendix 5, Chart A) has been developed for tracking "due dates" and resource needs. The procedure includes a reporting system to advise the project manager of delays that could affect schedules and

CSSQ agreements. Details of the tracking procedure and the resource management procedure are included in **Part V: New Procedures.**

3. Monitoring the CSSQ Development and Dispute Resolution

The RSE is responsible for reviewing the drafts of the EPP and other CSSQ documents from a soils perspective and alerting the SMB to changes in the CSSQ which may have impacts on soils aspects of the project. Should a conflict arise, the dispute resolution procedures identified in the Procedure for Managing Projects will be followed, with the RSE assisting the project manager in coordinating the communication and negotiation between SMB and the other involved parties.

4. Scheduling and Committing Resources to the CSSQ

The authority to schedule and commit SMB resources to CSSQ Agreements is delegated to the following under the conditions noted in the Staff Resource Estimating Procedure:

- Regional Soils Engineer
- MO Structures (Director of the Bridge Design Bureau)
- Soil Mechanics Bureau job managers (section heads)

For projects where the SMB is a signer of the CSSQ Agreement (those projects having major soils involvement), the signer will be the section head of the involved design unit.

To track resource commitments, a procedure (Appendix 5, Chart B) has been developed to allow job managers (section heads and squad leaders) to make a continuous assessment of the ability of the unit to commit additional resources.

The RSE is responsible for scheduling, prioritizing and committing regional drilling forces for soil explorations (Appendix 5, Chart C). These efforts should be coordinated with SMB through HD&C for borings requested by SMB.

Subsurface explorations, primarily the drilling operations, are the single soils-related project activity that has the most potential for major impacts on project schedules if missed or slipped. For this reason, it will be necessary for the RSE to develop a tracking resource needs work summary similar to what is being proposed for SMB on all projects requiring drilling activities, such as shown on Chart C.

IV. QUALITY ASSURANCE/QUALITY CONTROL AND DECENTRALIZATION

The SMB will continue to provide specialized geotechnical expertise beyond that available in the Regions and other MOFU's. Because of the highly specialized technical nature of the soils design specialty, major decentralization is not planned statewide.

SMB will control and assure quality of its own activities using current practice. As designs are progressed, Regional/SMB liaison is maintained to assure conformance with Regional commitments and needs. Designs are subject to internal reviews as the ASE's and SMB designers work together to assure proper use of payment items and constructibility. Peer reviews of designs are conducted among the HD&C section members to assure experiences are exchanged. New or unusual materials or techniques are documented through case histories which are widely distributed to the geotechnical community. The post-construction review report introduced under the PPM system will be incorporated into existing evaluation procedures. The SMB laboratories will continue to participate in the IAST, SMRL and AMRL programs for quality assurance/quality control.

V. NEW PROCEDURES TO ACCOMMODATE PROJECT MANAGEMENT

1. Staff Resource Estimating Procedure

Staffing standards and guidelines have been established for routine projects in the Soils program area based on historical data (from the IAS). Meetings were held with Bureau personnel to assess the reasonableness of the data, and values were adjusted up or down as necessary. Table 1 is a summary of the breakdown in range of staffing needs in staff days for the major phases of each type of project with Soils involvement.

The range of total staffing standards was obtained by adding the staff effort for each of the project phases as shown in Tables 2- 12. The staffing guidelines (in staff years) represent the maximum in the range of total staffing standards for each type of project.

It is expected that the guidelines shown in Table 1 will be used by Regional Soils Engineers and the Structures Division for estimating staff resource needs for routine projects. Generally projects with only routine soils involvment will, as in the past, be the responsibility of the RSE with input from SMB at the discretion of the RSE. The Regional Soils Engieners and the Structures Division should solicit input to staffing needs from the Soil Mechanics Bureau on projects having major Soils involvement or on projects with major Soils activities that have not been standardized.

During the initial transition and implementation phase of the resource estimating system, for all project types on Table 1, the RSE's should consult the HD&C section, and the Structures Division should consult the SMB Structure Foundation Section, for providing the Regions and Structures Division with resource estimates on all projects, with input from the respective Bureau Section Heads, until enough experience is gained that the tables can be used with confidence.

It should be noted that resource estimates in the Soils program resource management system are not for scheduling; it is only to provide estimates of staff effort. In general, the program area has sufficient flexibility that scheduling is rarely critical.

A notable exception to this is the scheduling for subsurface explorations. Scheduling for drilling operations is critical and must receive significant attention. For the purpose of preliminary resource estimating and scheduling, the standard for drilling effort may be assumed to be 60 feet per week per drill crew.

To facilitate providing resource estimates, HD&C personnel, with input from other SMB sections, will fill out the project resource estimating and tracking worksheet, as shown for the example problems in Appendix A, with staffing needs for each applicable major soils activity and provide this information to the project manager via the RSE or the Structures Division.

2. *Project Tracking Procedure*

The SMB, HD&C section will have the prime responsibility for ensuring that SMB project activity deadlines are met in a timely manner for both routine projects and projects with major soils involvement. To facilitate this, HD&C will fill out the project resource estimating and tracking worksheet with due dates for each major soils activity and will track these activities as shown on the example project scheduling work summary. Due dates need to be verified and/or obtained from the Structures Division for bridge activities. This summary will act as a tickle list of project activity due dates on a Region-by-Region basis. HD&C will provide a monthly update of this work summary to each section head to insure that the critical activities are completed on time. Each section head will report back to HD&C if a problem arises with respect to activity due dates to assess the potential for major impacts on project schedules in order to alert project managers of such in a timely manner. In reality, as in the past, when a problem arises with due dates, it can usually be resolved by temporarily reassigning staff from other Bureau sections to accomplish the work on time.

The example problems contain 4 projects with degrees of soils involvement ranging from minor to major (Appendix 5, Chart A). It is expected

that the status of each regional project will be accomplished by highlighting the activities that have been completed and by placing a percentage complete sign under activities that are partially completed. As shown on Chart A, the major activities that need tracking are those required during the scoping and design phases. Construction activities are not driven by a preestablished schedule and are more dependent on contractors' operations. Construction support is, therefore, provided on an as needed basis, and subsequently there are no activity points shown on Chart A.

Due to the large number of ongoing projects with significant soils activities (30 to 50 per Region) and the continuing need to update, add new projects and delete old projects from the system, it is proposed to set up the tracking system with the use of our Intergraph CADD Micro Station.

Part of the tracking system's function will be to identify when resources are not sufficient to complete project activities on time. The two functional areas in the SMB where this could become a problem are in the Structure Foundation Section and Roadway Foundation Section. The main Function Code activities for the Structure Foundation Section are E305 (Bridge Foundation), E307 (Wall Foundation) and E309 (Culvert Foundation) and for the Roadway Foundation Section is E303 (Roadway Foundation).

Tracking resource needs for these activities will flag a potential staffing problem in the respective SMB Sections. This is accomplished by filling out the average staff per phase column on the project resource estimating and tracking worksheet. This has been done for example projects 1 through 4 previously used for the tracking example problem. The average required staff per phase is obtained by dividing the estimated effort in staff days by the phase duration in days (adjusted to 18 production days worked per month to account for vacation, sick leave, etc.) This information is depicted on Chart B.

The summation of staffing needs of the Structure Foundation Unit for the 4 example projects is obtained by adding the total amount for each project in column form. This total value is compared to the actual number of staff available to do project design work. In reality there may be as many as 50 to 100 projects being tracked at any one time for all 11 regions. The total amount of staffing needs for all these projects must be continuously tracked with respect to actual staff to assess the ability of existing staff and to accomplish the work on time.

The RSE will be responsible for tracking activity deadlines for drilling activities. A suggested tracking method is shown on Chart C.

3. PPM Project Identification System

The Department's project tracking system, whether it be the current PAC II system or its replacement, will have project management related codings that will help to identify projects as being under the PPM system.

At this time, the Program and Project Management Division is planning to add to PAC II a coding that identifies the project's group designation (Group A, B or C) and the name of the project manager. These codes should be in place in the PAC II system by January, 1992 or soon after.

Project information documents currently used by the Bureau will soon include the project management related codings, which will help to identify projects under the PPM system. It is important that designers and others identify their project as being under either the PPM system or the old system, as the reporting and tracking requirements are different.

The new staff resource and tracking systems will be utilized on projects being progressed under the new project management system. Projects that are still under the old system will gradually be transitioned to the new system.

VI. SOILS PROGRAM PROJECT LEVEL ACTIVITIES

The charts on the following pages depict the activities of the RSE and the SMB during the Project Scoping, Design and Construction phases.

VII. SOILS PROGRAM GUIDE COORDINATION

Comments should be directed to Wes Moody, Director, SMB (518) 457-4712 or Verne McGuffey, Assistant Director, SMB (518) 457-4710.

SOILS PROGRAM IN HIGHWAY PROJECT DEVELOPMENT

PROJECT SCOPING AND DEVELOPMENT			
ORGANIZATION		***PROVIDES:*** Regional Soils Engineer with:	***RECEIVES:*** Terrain Reconnaissance Report or Preliminary Soils Report
REGION PLANNING AND PROGRAM MANAGEMENT GROUP		♦ Corridor Location Plan and/or Project Description ♦ Completion Deadline for Report	
SOILS PROGRAM	**REGIONAL SOILS SECTION**	***PREPARES PRELIMINARY SOILS REPORT*** Identify major soil and rock deposits on project or in each corridor, evaluate engineering significance of major deposits that could affect highway performance, construction costs and schedules. Occasionally, right-of-way considerations may be influenced by soil and rock deposits. A. Field Reconnaissance 1. Performance of nearby facilities 2. Evaluation of existing pavement and shoulder performance and determination of need for drainage improvements to existing facilities. B. Survey of Existing Soil Maps 1. Agricultural Soil Maps 2. Geologic literature 3. Analysis of air photos 4. Review of previous subsurface explorations C. Preliminary subsurface exploration if needed for major problem evaluation.	
	SOIL MECHANICS BUREAU	***PROVIDES:*** technical assistance to Region where required. 1. Terrain Reconnaissance Reports for major projects on new location when requested by Region. 2. Assistance to Regional Soils Section in preparation of reports.	

SOILS PROGRAM IN HIGHWAY PROJECT DEVELOPMENT

PRELIMINARY DESIGN (PHASE I)			
ORGANIZATION		***PROVIDES:*** Regional Soils Engineer with: ♦ Plans, profiles and typical sections of alternate designs	***RECEIVES:*** Soils Report for inclusions in Phase I Design Report
REGION DESIGN GROUP			
SOILS PROGRAM	**REGIONAL SOILS SECTION**	***PREPARES SOIL REPORT FOR PHASE I DESIGN REPORT*** 1. Identify major soil and rock deposits for each alternate design and prepare subsurface exploration plan. a) Field Reconnaissance 1. Performance of existing highway and nearby facilities. b) Survey of Existing Soil Data c) Preliminary subsurface explorations in major problem areas for feasibility studies and evaluation of economic and environmental considerations. 2. Determine engineering significance of major deposits that could affect highway performance, construction costs; influence of soil and rock deposits on location, alignment, and right-of-way considerations, and appearance of completed project. 3. Evaluate existing pavement and shoulder structure and foundation conditions for Resurfacing, Restoration, and Rehabilitation (3R) projects in conjunction with Regional Materials Engineer.	
	SOIL MECHANICS BUREAU	***PROVIDES:*** technical assistance to Region where required	

SOILS PROGRAM IN HIGHWAY PROJECT DEVELOPMENT

ADVANCE DETAIL DESIGN (PHASE V)

ORGANIZATION	*PROVIDES:* Regional Soils Engineer with:	*RECEIVES:* Soils Report for Advance Detail Plans
REGION DESIGN GROUP	♦ Plans, profiles and generalized typical cross sections ♦ All plan and profile changes in design development ♦ Completion deadline for report	

SOILS PROGRAM

REGIONAL SOILS SECTION

PREPARES SOILS REPORT FOR PHASE V - ADVANCE DETAIL PLANS

1. Recommendations to provide designers necessary information to prepare plans and quantity and cost estimates for earthwork items.
2. Confirms location, alignment and right-of-way treatments based on soil and rock conditions.
3. Recommendations for treatment of embankment foundation problems and cut slopes.
4. Determine that sufficient subsurface explorations have been progressed, provides recommendations for toe of slope ditches, subsurface drainage, unsuitable material removal, undercutting unstable soils, granular construction lifts, granular slope protection treatment, subbase design, topsoil sources, granular material sources, earthwork factors and earthwork considerations for bank and channel protection, soil parameters for sheeting design, recharge basins.
5. Special Earthwork Specifications and Typical Sections, if required.
6. Accurate location of all subsurface explorations; coordinate data for plotting on plans.

SOIL MECHANICS BUREAU

PROVIDES: technical services and technical assistance to Regions when required, such as:

1. Geophysical Surveys - Seismic Exploration to determine depth to rock surface for cut slope design and earthwork quantity estimates.
2. Rock Outcrop Mapping - Preparation of rock outcrop map to aid designers in determination of rock surface for earthwork quantity estimates.
3. Geologic Surveys - Rock Cut Slopes - Recommendation for rock cut slope treatment.
4. Roadway Foundation Design - Recommendations for treatment of embankment foundation soils in critical areas.
5. Earth Cut Slope Design - Recommendation in critical soil and groundwater seepage areas.
6. Retaining walls designed by Regions - Recommendations for vertical and lateral earth pressure considerations.
7. Roadway Design - General Assistance to Regional Soils Engineer where required.
8. Pipe Design - Unusual problems involving earth pressures and jacking procedures.
9. Channel Slope Protection - Problems involving rip-rap, gabions, fabriform treatments and filter designs; except in the vicinity of structures
10. Subsurface Exploration - Provides special equipment, technical advisory service, and prepares drilling contracts.
11. Provides data for recharge basin design.

SOILS PROGRAM IN HIGHWAY PROJECT DEVELOPMENT

FINAL DESIGN (PHASE VI)			
ORGANIZATION		***PROVIDES:*** Regional Soils Engineer with:	***RECEIVES:*** Final Soils Report
REGION DESIGN GROUP		♦ Plans, profiles and earthwork specifications ♦ Completion deadline for report	
SOILS PROGRAM	**REGIONAL SOILS SECTION**	***PREPARES SOILS REPORT FOR FINAL P.S.&E.,*** Providing or Confirming previously provided: 1. Detailed recommendations on previously reported treatments sufficient for preparation of final plans and quantity estimates. 2. Special earthwork specifications, if required. 3. Provides accurate coordinate location of all subsurface exploration data for plotting on plans. 4. Special Typical Sections and details, if required. 5. Package of all soils data for examination by bidders.	
	SOIL MECHANICS BUREAU	***PROVIDES:*** technical services and technical assistance to Regions when required.	

SOILS PROGRAM IN HIGHWAY PROJECT DEVELOPMENT

<table>
<tr><th colspan="3">CONSTRUCTION</th></tr>
<tr><th colspan="2">ORGANIZATION</th><th>REQUESTS: Regional Soils Engineer provide:

♦ Pre-construction Soils Meeting
♦ Pre-blasting meeting
♦ Sampling and Testing Granular Material
♦ Quality of Stone Fill
♦ Earthwork Inspector Training and Equipment
♦ Soils construction advice</th><th>RECEIVES: requested data, training and equpiment</th></tr>
<tr><td colspan="2">REGION CONSTRUCTION GROUP</td><td colspan="2"></td></tr>
<tr><td rowspan="2">SOILS PROGRAM</td><td>REGIONAL SOILS SECTION</td><td colspan="2">REQUESTS: technical assistance when required

PROVIDES: requested data, service, training and equipment, and reports</td></tr>
<tr><td>SOIL MECHANICS BUREAU</td><td>PROVIDES:

Test data:
♦ Subbase Gravel
♦ Compaction Curves
♦ Topsoil

Project Testing Equipment and Supplies</td><td>Services:

Inspections, Reports;
♦ Stone Filling and Rip-Rap
♦ Presplitting & Rock Excavation inspection
♦ Pre-blasting Meeting expertise
♦ Water well installation
♦ Instrumentation
♦ Field construction problem recommendations
♦ Structure Pile Length analysis
♦ Rock Foundaton Inspection
♦ Order-on-Contract Review</td></tr>
</table>

APPENDIX 1

ACRONYMS ASSOCIATED WITH PROGRAM AND PROJECT MANAGEMENT

ASE - Area Soils Engineer
CMB - Consultant Management Bureau
CSSQ - Cost, Scope, Schedule and Quality
DQAB - Design Quality Assurance Bureau
EPP - Expanded Project Proposal
FM - functional manager
HD&C - Highway Design and Construction
IAST - Independent Assurance Sampling and Testing
IPP - Initial Project Proposal
JM - job manager
MB - Materials Bureau
MOFU - Main Office Functional Unit
OPPM - Office of Planning and Program Management
PM - Project Manager
PMP - Project Management Plan
PPM - Program and Project Management
QA - Quality Assurance
QC - Quality Control
RME - Regional Materials Engineer
RPPM - Region Planning and Program Manager
RSE - Regional Soils Engineer
SMB - Soil Mechanics Bureau
SMRL - Soil Mechanics Reference Laboratory
SFS - Structure Foundation Section

APPENDIX 2

CONCEPTS AND DEFINITIONS ASSOCIATED WITH PROGRAM AND PROJECT MANAGEMENT

Concepts and definitions taken from **Procedure for Managing Projects, Third Working Draft.** *For more information and greater detail, please consult this publication, available from the Implementation Management Team or the Technical Services Division office.*

CSSQ Agreements (CSSQA): agreements between coworkers that define what the project is and how it will be produced. It is a tool for managing the resources needed to produce the project and maintaining communications on the project. CSSQA's are assembled by the project manager and consist of three parts: 1) a signature sheet, 2) a Project Management Plan, and 3) an Initial Project Proposal, Expanded Project Proposal, or a design approval document (Final Design Report, 3R Report or the equivalent). There are three possible types of CSSQA's:

- CSSQA for Project Scoping
- CSSQA for Preliminary Design .
- CSSQA for Detailed Design and Construction

Expanded Project Proposal (EPP): the end product of the scoping stage. The EPP is prepared by the project developer who refines and expands the cost, schedule, and scope information contained in the Initial Project Proposal. From its earliest draft, the EPP follows the format of the document needed to obtain design approval. It will evolve into, but it is not as complete as, the report prepared in Phase I of preliminary design. The EPP becomes a part of the CSSQ Agreement for Preliminary Design.

There are two primary purposes of the EPP:

1. Present a scope and cost estimate that signatories to the CSSQA for Preliminary Design can accept as a) a "reasonable approximation" of the scope expected at design approval, and b) the most accurate cost estimate possible based on available information.

2. Enable the CSSQ signatories to supply the project manager with a good estimate of staff resources needed for preliminary design, with a schedule the designer believes is realistic.

Note If a project does not require a formal preliminary design stage, (Group A projects), the EPP is not usually published as an independent report.

Functional Area: a major technical or administrative specialty unit in the Department, organized and operating at a specific geographic location. The Technical Services Division is a functional area.

Functional Manager (FM): heads of region and main office functional areas that produce capital projects; the manager who controls the resources for the functional area. The Director of the Technical Services Division is the functional manager for the Soils and Materials program areas.

Initial Project Proposal (IPP): a two page thumbnail sketch used for initial planning and program purposes of a project. The IPP may have attached to it the results of any prior concept studies done for the more complex projects. It represents a candidate proposal for capital improvement. The completed IPP represents "first cut" information including:

- Preliminary description of the problem or the reason for the project
- Preliminary objectives of the project and its relation to program goals
- Preliminary outline of the project scope
- Preliminary estimate of construction cost based on experience
- Preliminary schedule, usually the desired letting date
- Anticipated NEPA and/or SEQR classification
- Notes on special circumstances, e.g. public sensitivity, permit requirements, a political commitment, etc.
- Information for the program listing including anticipated fund source, program letting date, anticipated project management group and statewide significance determination

Job Manager (JM): a manager in a functional area responsible for producing a significant portion of a project, either directly or through consultant services. For example, a design squad leader may be the job manager for highway design, the structures engineer for bridge design, and the engineer-in-charge for construction. Generally, the CSSQ Agreement (in the project management plan) specifies project jobs and job manager responsibilities. Although job managers work closely with project managers, their direct supervision comes from their functional manager.

Project Developer (PD): the person who prepares the "Expanded Project Proposal". This person may be located in the project scoping unit of the Region Planning and Program Management group, in the Region Design group, or for selected projects, in a main office unit.

Project Group designation: denotes which of the three general management strategies is to be employed by the project manager in managing a project. The key distinction between the three project groups (A, B, and C) is the number of CSSQ Agreements a project is likely to require (A one, B two and C three). This number is influenced by the

production stages a project must follow and the magnitude of resources estimated for completion of these stages. The Regional Planning and Program Manager initially uses the project group designation as a guide in preparing the Initial Project Proposal, and in determining the project manager to assign to the project.

Group A projects are relatively routine with single purpose scopes. Typical Group A projects include: bridge painting, minor bridge rehabilitations, shoulder resurfacing, and sign and signal replacement projects.

Group B projects range from small projects requiring only design phases I and IV to larger projects requiring design phases I - VI. Typical Group B projects include: highway reconstruction, some capacity improvements, and bridge replacement projects.

Group C projects are large, complex, and usually controversial, typically requiring location planning studies and/or extensive environmental planning analysis. Group C projects require all design phases. Some current Group C projects require all design phases. Some current Group C projects include the Gowanus Expressway, the LIE Capacity improvement, and the Corning Bypass.

Project Manager (PM): an individual responsible for monitoring, coordinating and evaluating project activities from the Initial Project Proposal through post-construction review. Project managers are almost always region-based.

Some project managers are assigned from the Region Planning and Program Management group and have project management duties as their major activity. They are usually assigned several projects, and they report to the Region Planning and Program Manager, either directly or through a supervisor.

Other project managers may be located in a functional group other than the Region Planning and Program Management Group. These project managers may have project management responsibilities for one or more projects as well. This "part time" project manager reports to the functional manager for job production and functional area duties, and to the Region Planning and Program Manager for project management duties.

Project Management Plan (PMP): a "course of action" prepared by the project manager in consultation with other project participants. It outlines a plan for producing and delivering the next major project state - either scoping, preliminary design, or detailed design and construction. The PMP identifies functional job responsibilities (including job sub-elements), consultant services required, key events, milestones, schedule of work, anticipated funds needed, any special management objectives and concerns, and quality assurance expectations. As a part of a CSSQ Agreement, the PMP must be sufficiently detailed for CSSQ signatories to know

what to expect from their interdependent activities. The PMP will provide continuity for project management even if the project manager changes.

Post-Construction Review: an evaluation of the completed construction project from a variety of performance perspectives. It involves the project manager, the Engineer-in-charge, various functional/job managers, and others. The primary focus is on:

- conformance to the CSSQ Agreement,
- the manner in which CSSQA changes were dealt with,
- conformance to the technical requirements of the project's contract plans and specifications,
- assessment of the constructability, operability, maintainability and environmental/community fit of the finished project, and
- assessment of completed project production and project management actions relative to prevailing policies and procedures.

The review results are summarized in a report prepared by the project manager and provide feedback to functional managers, project managers, job managers and others for any necessary changes to policies, procedures, practices or standards.

Quality: conformance to customer requirements. These requirements are embodied in the project's negotiated cost, schedule, and scope (which includes technical standards). Thus a project developed, designed, and constructed in accordance with applicable policies, procedures and standards and delivered within the cost, schedule and scope in the CSSQ Agreement is a quality project.

Quality Assurance: an ongoing management function involving planning and taking systematic actions that assure work processes and products are actually doing what is intended. This means checking that quality control and assurance functions and work requirements (such as found in policies, procedures, practices, and standards) are reasonable and adequate when applied to specific tasks or jobs. If requirements are lacking or excessive, they should be changed.

Quality Control: an ongoing function performed while producing work products to insure the appropriate standards, policies and procedures are being applied and met. It requires work planning, coordinating, developing, checking, and reviewing. Every employee is individually responsible for controlling the quality of their own work products.

Review: consists of one unit or individual examining the work product or process of another. Each review must be preceded by a clear and mutual understanding between the reviewer and reviewee of the review requirements and expectations prior to conducting the review. These requirements and expectations should be standardized for all reviews, and must include:

- review purpose and scope; what is the review for and what is to be reviewed?
- review criteria: what policies, procedures, technical standards, CSSQ Agreements, or checklists are to be used as the basis of the review?
- review timing: when is it to be reviewed, how long will it take, when are review comments due?
- reviewer/review team: who will do the review, what is the review team's structure and qualifications?
- review reports: what must be documented, what format is to be used, who gets copies and for what purpose?
- disposition of review findings: what are the obligations of the reviewer and the reviewee regarding the report findings and who has followup responsibilities for remedial actions?
- conflict resolution: how will disagreements over review findings be resolved?

Regional Planning and Program Manager (RPPM): director of the Region Planning and Program Management Group; reports to the Regional Director. The RPPM is responsible for several areas of activity, including regional transportation systems planning, capital program planning and management, and capital project management. The RPPM supervises all region project managers when they are performing project management duties.

APPENDIX 3

TABLE 1 - PROJECT LEVEL STAFFING STANDARDS AND GUIDELINES

TABLE 2 THROUGH 12 - STAFFING STANDARDS BY PROJECT TYPE

PROJECT PHASE		MINOR SOI INVOLVEME * (TABLE 2	OR NG SOIL E 10)	RETAINING WALL < 100'LONG (TABLE 11)	RETAINING WALL > 100'LONG (TABLE 12)	MAJOR SOILS INVOLVEMENT **
STAFF DAYS	SCOPING	0–0.5	7	0–1	0–1.5	ACCURATE STAFFING REQUIREMENTS TO BE DETERMINED AT PROJECT SCOPING PHASE
	PREL. DESG.	1–2	5	1–2.5	1–2.5	
	DETAIL DESG.	1–2	143	10–12	13–16	
	CONSTRUCTION	1–1.5	14	2–4.5	3–5	
	TOTAL	3–6	179	13–20	17–25	
STAFF YEARS	GUIDELINE	0.03	3	0.08	0.1	UP TO 2 TO 4

* THESE PROJECTS GENERALLY Y HD&C.
** THESE PROJECTS INVOLVE SME MAJOR NEW HIGHWAYS AND WIDENINGS.

TABLE 1

APPENDIX 3

TABLE 1 - PROJECT LEVEL STAFFING STANDARDS AND GUIDELINES

TABLE 2 THROUGH 12 - STAFFING STANDARDS BY PROJECT TYPE

PROJECT LEVEL STAFFING STANDARDS & GUIDELINES
SOIL MECHANICS BUREAU

PROJECT PHASE		PROJECT TYPE										
		MINOR SOILS INVOLVEMENT * (TABLE 2)	BRIDGE REPLACEMENT 1 TO 3 SPAN		NEW BRIDGE OR BRIDGE REPLACEMENT MULTI-SPAN/VIADUCT		HIGHWAY WIDENING < 300' LONG		NEW HIGHWAY OR HIGHWAY WIDENING > 300' LONG		RETAINING WALL < 100'LONG (TABLE 11)	RETAINING WALL > 100'LONG (TABLE 12)	MAJOR SOILS INVOLVEMENT **
			GOOD SOIL (TABLE 3)	SOFT SOIL (TABLE 4)	GOOD SOIL (TABLE 5)	SOFT SOIL (TABLE 6)	GOOD SOIL (TABLE 7)	SOFT SOIL (TABLE 8)	GOOD SOIL (TABLE 9)	SOFT SOIL (TABLE 10)			
STAFF DAYS	SCOPING	0–0.5	0–2.5	3–8	3–5	7–10	0–0.5	2–5	1–2	5–7	0–1	0–1.5	ACCURATE STAFFING REQUIREMENTS TO BE DETERMINED AT PROJECT SCOPING PHASE
	PREL. DESG.	1–2	2–4	7–11	4–7	12–18	1–2	5–8	1–2	10–15	1–2.5	1–2.5	
	DETAIL DESG.	1–2	12–17	66–88	29–37	129–174	1–2	55–73	2–3	107–143	10–12	13–16	
	CONSTRUCTION	1–1.5	2–4.5	6–10	8–13	13–19	1–1.5	4–6	2–3	10–14	2–4.5	3–5	
	TOTAL	3–6	16–28	82–117	44–62	161–221	3–6	66–92	6–10	132–179	13–20	17–25	
STAFF YEARS	GUIDELINE	0.03	0.1	0.5	0.3	1.0	0.03	0.4	0.05	0.8	0.08	0.1	UP TO 2 TO 4

* THESE PROJECTS GENERALLY DO NOT REQUIRE INPUT FROM SMB DESIGN SECTIONS AND ARE USUALLY HANDLED ONLY BY HD&C.
** THESE PROJECTS INVOLVE SMB DESIGN SECTIONS AND CAN INCLUDE MANY TYPES OF STRUCTURE FOUNDATIONS AND/OR MAJOR NEW HIGHWAYS AND WIDENINGS.

TABLE 1

STAFFING STANDARDS – STAFF DAYS
SOIL MECHANICS BUREAU
MINOR SOILS INVOLVEMENT

	ACTIVITY	
	GEN. REV'S. & RECOM.	
PROJECT PHASE		TOTAL
SCOPING	0–0.5	0–0.5
PRELIM. DESIGN	1–2	1–2
DETAIL DESIGN	1–2	1–2
CONSTRUCT.	1–1.5	1–1.5
TOTAL	3–6	3–6

TABLE 2

STAFFING STANDARDS – STAFF DAYS
SOIL MECHANICS BUREAU
BRIDGE REPLACEMENT – GOOD SOIL
1 TO 3 SPAN

	ACTIVITY					
PROJECT PHASE		GEN. REV'S. & RECOM.	BRIDGE FND. *	SOIL SAMPLE DESCRIPTION		TOTAL
SCOPING		0–0.5	0–2	–		0–2.5
PRELIM. DESIGN		1–2	1–2	–		2–4
DETAIL DESIGN		1–2	10–14	1		12–17
CONSTRUCT.		1–1.5	1–3	–		2–4.5
TOTAL		3–6	12–21	1		16–28

* INCLUDES DPLT TESTS

TABLE 3

STAFFING STANDARDS – STAFF DAYS
SOIL MECHANICS BUREAU
BRIDGE REPLACEMENT – SOFT SOIL
1 TO 3 SPAN

	ACTIVITY							
PROJECT PHASE	GEN. REV'S. & RECOM.	EMBANK. FND.	BRIDGE FND. *	SOIL SAMPLE DESCRIPT.	SOIL SAMPLE CLASSIF.	SOIL STRENGTH TEST	SOIL CONSOL. TEST	TOTAL
SCOPING	2–3	1–3	0–2	–	–	–	–	3–8
PRELIM. DESIGN	2–3	4–6	1–2	–	–	–	–	7–11
DETAIL DESIGN	3–4	30–36	10–14	1	2–3	10–15	10–15	66–88
CONSTRUCT.	3–4	2–3	1–3	–	–	–	–	6–10
TOTAL	10–14	37–48	12–21	1	2–3	10–15	10–15	82–117

* INCLUDES DPLT TESTS

TABLE 4

STAFFING STANDARDS – STAFF DAYS
SOIL MECHANICS BUREAU
NEW BRIDGE OR BRIDGE REPLACE. – GOOD SOIL
MULTI–SPAN OR VIADUCT

		ACTIVITY				
		GEN. REV'S & RECOM.	BRIDGE FND. *	SOIL SAMPLE DESCRIPT.		
PROJECT PHASE						TOTAL
SCOPING		1–2	2–3	–		3–5
PRELIM. DESIGN		1–2	3–5	–		4–7
DETAIL DESIGN		2–3	25–30	2–4		29–37
CONSTRUCT.		5–7	3–6	–		8–13
TOTAL		9–14	33–44	2–4		44–62

* INCLUDES DPLT TESTS

TABLE 5

STAFFING STANDARDS – STAFF DAYS
SOIL MECHANICS BUREAU
NEW BRIDGE OR BRIDGE REPLACE. – SOFT SOIL
MULTI–SPAN OR VIADUCT

	ACTIVITY							
PROJECT PHASE	GEN. REV'S & RECOM.	EMBANK. FND.	BRIDGE FND. *	SOIL SAMPLE DESCRIPT.	SOIL SAMPLE CLASSIF.	SOIL STRENGTH TEST	SOIL CONSOL. TEST	TOTAL
SCOPING	2–3	3–4	2–3	–	–	–	–	7–10
PRELIM. DESIGN	2–3	8–12	2–3	–	–	–	–	12–18
DETAIL DESIGN	3–4	60–72	20–28	2–4	4–6	20–30	20–30	129–174
CONSTRUCT.	6–8	4–6	3–5	–	–	–	–	13–19
TOTAL	13–18	75–94	27–39	2–4	4–6	20–30	20–30	161–221

* INCLUDES DPLT TESTS

TABLE 6

STAFFING STANDARDS – STAFF DAYS
SOIL MECHANICS BUREAU
HIGHWAY WIDENING – GOOD SOIL
< 300' LONG

	ACTIVITY	
	GEN. REV'S & RECOM.	
PROJECT PHASE		TOTAL
SCOPING	0–0.5	0–0.5
PRELIM. DESIGN	1–2	1–2
DETAIL DESIGN	1–2	1–2
CONSTRUCT.	1–1.5	1–1.5
TOTAL	3–6	3–6

TABLE 7

STAFFING STANDARDS – STAFF DAYS
SOIL MECHANICS BUREAU
HIGHWAY WIDENING – SOFT SOIL
> 300' LONG

	ACTIVITY							
		GEN. REV'S & RECOM.	EMBANK. FND.	SOIL SAMPLE DESCRIPT.	SOIL SAMPLE CLASSIF.	SOIL STRENGTH TEST	SOIL CONSOL. TEST	
PROJECT PHASE								TOTAL
SCOPING		1–2	1–3	–	–	–	–	2–5
PRELIM. DESIGN		1–2	4–6	–	–	–	–	5–8
DETAIL DESIGN		2–3	30–36	1	2–3	10–15	10–15	55–73
CONSTRUCT.		2–3	2–3	–	–	–	–	4–6
TOTAL		6–10	37–48	1	2–3	10–15	10–15	66–92

STAFFING STANDARDS – STAFF DAYS
SOIL MECHANICS BUREAU
HIGHWAY WIDENING – GOOD SOIL
>300' LONG

	ACTIVITY	
	GEN. REV'S & RECOM.	
PROJECT PHASE		TOTAL
SCOPING	1–2	1–2
PRELIM. DESIGN	1–2	1–2
DETAIL DESIGN	2–3	2–3
CONSTRUCT.	2–3	2–3
TOTAL	6–10	6–10

STAFFING STANDARDS – STAFF DAYS
SOIL MECHANICS BUREAU
HIGHWAY WIDENING – SOFT SOIL
>300' LONG

	ACTIVITY							
PROJECT PHASE		GEN. REV'S & RECOM.	EMBANK. FND.	SOIL SAMPLE DESCRIPT.	SOIL SAMPLE CLASSIF.	SOIL STRENGTH TEST	SOIL CONSOL. TEST	TOTAL
SCOPING		2–3	3–4	–	–	–	–	5–7
PRELIM. DESIGN		2–3	8–12	–	–	–	–	10–15
DETAIL DESIGN		3–4	60–72	2–4	2–3	20–30	20–30	107–143
CONSTRUCT.		6–8	4–6	–	–	–	–	10–14
TOTAL		13–18	75–94	2–4	2–3	20–30	20–30	132–179

TABLE 10

STAFFING STANDARDS – STAFF DAYS
SOIL MECHANICS BUREAU
RETAINING WALL – <100'LONG

	ACTIVITY				
PROJECT PHASE		GEN. REV'S & RECOM.	WALL FND.	SOIL SAMPLE DESCRIPT.	TOTAL
SCOPING		0–0.5	0–0.5	–	0–1
PRELIM. DESIGN		0–0.5	1–2	–	1–2.5
DETAIL DESIGN		1–2	8–9	1	10–12
CONSTRUCT.		1–2	1–2.5	–	2–4.5
TOTAL		2–5	10–14	1	13–20

TABLE 11

STAFFING STANDARDS – STAFF DAYS
SOIL MECHANICS BUREAU
RETAINING WALL – >100'LONG

	ACTIVITY					
		GEN. REV'S & RECOM.	WALL FND.	SOIL SAMPLE DESCRIPT.		
PROJECT PHASE						TOTAL
SCOPING		0–0.5	0–1	–		0–1.5
PRELIM. DESIGN		0–0.5	1–2	–		1–2.5
DETAIL DESIGN		1–2	10–12	2		13–16
CONSTRUCT.		1–2	2–3	–		3–5
TOTAL		2–5	13–18	2		17–25

TABLE 12

APPENDIX 4

EXAMPLE PROBLEMS 1 THROUGH 4

EXAMPLE PROBLEM

PROJECT RESOURCE ESTIMATING AND TRACKING WORKSHEET

SOIL MECHANICS BUREAU

PIN PROJECT 1 Proj. Type (1-9) R&P Orig. Estimate Date / / Estimator HD&C

Proj. Desc. & Loc. DRAINAGE IMPROVEMENT Rev. Estimate Date / / Estimator HD&C

Revision No. 1 Est. Proj. Cost($M) ____

MENU OF ACTIVITIES	FUNCTION CODES	ESTIMATED EFFORT WITHIN PIN (STAFF DAYS)	DUE DATES	AVERAGE STAFF PER PHASE
SCOPING (PRE-PHASE I)			Begin 4/1/92	
A. Existing Info. review, Site inspection, needs assessment for CSSQ.	E301 E303 E305	0.5	5/1/92	
B. Obtain Prel. Subsurface Explorations & Surveys	E101, E102, E151, E301, E312, E313,			
C. Assistance in Scoping, Scheduling & Cost Estimating for CSSQ	E301			
Sub-total - Scoping		0.5	End 7/1/92	
PRELIMINARY DESIGN (PHASE I-IV)			Begin 7/1/92	
D. Gather & Review existing site info. & site inspec.	E301, E303, E305, E307, E309, E312, E313, E316, E318, E320, E342,	0.5	7/10/92	

MENU OF ACTIVITIES	FUNCTION CODES	ESTIMATED EFFORT WITHIN PIN (STAFF DAYS)	DUE DATES	AVERAGE STAFF PER PHASE
E. Subsurf. Explor. request & Prelim. Recommendations	E301, E303, E305, E307, E309, E316, E318, E320, E342	0.5	7/20/92	
F. Review Design Report & prepare written response	E301	0.5	8/1/92	
Sub-total - Preliminary Design		1.5	End 9/1/92	
FINAL DESIGN (PHASES V-VI)			Begin 9/1/92	
G. Obtain final subsurface explorations & surveys	E101, E102, E121, E124, E131, E135, E138, E139, E301, E312, E313,	0.3	10/15/92	
H. Review preliminary plans, additional site inspection, & prepare written response	E301	0.3	11/1/92	
I. Progress Soil Testing	E201, E202, E203, E204, E206, E207, E225	0.2	12/1/92	

MENU OF ACTIVITIES	FUNCTION CODES	ESTIMATED EFFORT WITHIN PIN (STAFF DAYS)	DUE DATES	AVERAGE STAFF PER PHASE
J. Review preliminary struc. plans and subsurface expl. & progress foundation analysis & prepare FIR or fndg. report	E301, E305, E307, E309, E312, E313,			
K. Review preliminary plans & subsurface explorations & progress foundation analysis (with alternate solutions) & prepare fndg. report	E301, E303, E309, E316, E318, E320, E342,			
L. Review ADP's & prepare written response	E301, E303, E305, E307, E309, E316, E318, E320, E342,	0.7	1/1/93	
M. Review Final prel. structures; plans & F.D.R.	E301, E305,			
N. Review PS&E	E301, E303, E305, E307, E309, E316, E318, E320, E324,			
Sub-total - Final Design		1.5	End 2/1/93	
Construction	E401, E304, E306, E308, E139,	3.0	Begin 2/1/93 End 11/1/93	
PROJECT TOTAL (Staff Days)				

EXAMPLE PROBLEM

PROJECT RESOURCE ESTIMATING AND TRACKING WORKSHEET
SOIL MECHANICS BUREAU

PIN PROJECT 2 Proj. Type (1-9) 1 SPAN BRIDGE Orig. Estimate Date / / Estimator HD&C

Proj. Desc. & Loc. REPLACEMENT (GOOD SOIL) Rev. Estimate Date / / Estimator HD&C

Revision No. ____ Est. Proj. Cost($M) ____

MENU OF ACTIVITIES	FUNCTION CODES	ESTIMATED EFFORT WITHIN PIN (STAFF DAYS)	DUE DATES	AVERAGE STAFF PER PHASE
SCOPING (PRE-PHASE I)			Begin 4/1/92	
A. Existing Info. review, Site inspection, needs assessment for CSSQ.	E301 E303 E305	0.5 0.5		 0.014
B. Obtain Prel. Subsurface Explorations & Surveys	E101, E102, E151, E301, E312, E313,			
C. Assistance in Scoping, Scheduling & Cost Estimating for CSSQ	E301			
Sub-total - Scoping		1.0	End 6/1/92	0.014 (E305)
PRELIMINARY DESIGN (PHASE I-IV)			Begin 6/1/92	
D. Gather & Review existing site info. & site inspec.	E301, E303, E305, E307, E309, E312, E313, E316, E318, E320, E342,	1.0 1.0	7/1/92	 0.014

MENU OF ACTIVITIES	FUNCTION CODES	ESTIMATED EFFORT WITHIN PIN (STAFF DAYS)	DUE DATES	AVERAGE STAFF PER PHASE
E. Subsurf. Explor. request & Prelim. Recommendations	E301,	0.2	8/1/92	
	E303,			
	E305,	0.3		0.009
	E307,			
	E309,			
	E316,			
	E318,			
	E320,			
	E342			
F. Review Design Report & prepare written response	E301			
Sub-total - Preliminary Design		2.5	End 10/1/92	0.018 (E305)
FINAL DESIGN (PHASES V-VI)			Begin 10/1/92	
G. Obtain final subsurface explorations & surveys	E101,			
	E102,			
	E121,			
	E124,			
	E131,			
	E135,			
	E138,			
	E139,			
	E301,			
	E312,			
	E313,			
H. Review preliminary plans, additional site inspection, & prepare written response	E301			
I. Progress Soil Testing	E201,	0.2	11/1/92	
	E202,			
	E203,			
	E204,			
	E206,			
	E207,			
	E225			

MENU OF ACTIVITIES	FUNCTION CODES	ESTIMATED EFFORT WITHIN PIN (STAFF DAYS)	DUE DATES	AVERAGE STAFF PER PHASE
J. Review preliminary struc. plans and subsurface expl. & progress foundation analysis & prepare FIR or fndg. report	E301, E305, E307, E309, E312, E313,	0.3 10.0	11/15/92	0.111
K. Review preliminary plans & subsurface explorations & progress foundation analysis (with alternate solutions) & prepare fndg. report	E301, E303, E309, E316, E318, E320, E342,			
L. Review ADP's & prepare written response	E301, E303, E305, E307, E309, E316, E318, E320, E342,			
M. Review Final prel. structures; plans & F.D.R.	E301, E305,	0.2 7.3	11/15/92	0.026
N. Review PS&E	E301, E303, E305, E307, E309, E316, E318, E320, E324,			
Sub-total - Final Design		17.0	End 3/1/93	0.137 (E305)
Construction	E401, E304, E306, E308, E139,	1.0 1.0	Begin 3/1/93 End 6/1/93	
PROJECT TOTAL (Staff Days)				

EXAMPLE PROBLEM

PROJECT RESOURCE ESTIMATING AND TRACKING WORKSHEET
SOIL MECHANICS BUREAU

PIN PROJECT 3 Proj. Type (1-9) VIADUCT Orig. Estimate Date / / Estimator HD&C

Proj. Desc. & Loc. WIDENING ON SOFT SOIL Rev. Estimate Date / / Estimator HD&C

Revision No. ____ Est. Proj. Cost($M) ____

MENU OF ACTIVITIES	FUNCTION CODES	ESTIMATED EFFORT WITHIN PIN (STAFF DAYS)	DUE DATES	AVERAGE STAFF PER PHASE
SCOPING (PRE-PHASE I)			Begin 4/1/92	
A. Existing Info. review, Site inspection, needs assessment for CSSQ.	E301	1.5	5/1/92	
	E303	2.0		
	E305	2.5		0.024
B. Obtain Prel. Subsurface Explorations & Surveys	E101,		7/1/92	
	E102,			
	E151,			
	E301,	1.5		
	E312,			
	E313,			
C. Assistance in Scoping, Scheduling & Cost Estimating for CSSQ	E301	1.5	9/1/92	
Sub-total - Scoping		9.0	End 10/1/92	0.023 (E305)
PRELIMINARY DESIGN (PHASE I-IV)			Begin 10/1/92	
D. Gather & Review existing site info. & site inspec.	E301,	1.5	11/1/92	
	E303,	2.0		
	E305,	1.0		0.008
	E307,			
	E309,			
	E312,			
	E313,			
	E316,			
	E318,			
	E320,			
	E342,			

MENU OF ACTIVITIES	FUNCTION CODES	ESTIMATED EFFORT WITHIN PIN (STAFF DAYS)	DUE DATES	AVERAGE STAFF PER PHASE
E. Subsurf. Explor. request & Prelim. Recommendations	E301,	1.5	2/1/93	
	E303,	5.0		
	E305,	2.0		0.016
	E307,			
	E309,			
	E316,			
	E318,			
	E320,			
	E342			
F. Review Design Report & prepare written response	E301			
Sub-total - Preliminary Design		13	End 5/1/93	0.024 (E305)
FINAL DESIGN (PHASES V-VI)			Begin 5/1/93	
G. Obtain final subsurface explorations & surveys	E101,		7/1/93	
	E102,			
	E121,			
	E124,			
	E131,			
	E135,			
	E138,			
	E139,			
	E301,	2.0		
	E312,			
	E313,			
H. Review preliminary plans, additional site inspection, & prepare written response	E301			
I. Progress Soil Testing	E201,	3.0	9/1/93	
	E202,	4.0		
	E203,			
	E204,	2.5		
	E206,	2.5		
	E207,			
	E225			

MENU OF ACTIVITIES	FUNCTION CODES	ESTIMATED EFFORT WITHIN PIN (STAFF DAYS)	DUE DATES	AVERAGE STAFF PER PHASE
J. Review preliminary struc. plans and subsurface expl. & progress foundation analysis & prepare FIR or fndg. report	E301, E305, E307, E309, E312, E313,	0.5 20	11/1/93	0.111
K. Review preliminary plans & subsurface explorations & progress foundation analysis (with alternate solutions) & prepare fndg. report	E301, E303, E309, E316, E318, E320, E342,	0.5 6.0	11/15/93	
L. Review ADP's & prepare written response	E301, E303, E305, E307, E309, E316, E318, E320, E342,			
M. Review Final prel. structures; plans & F.D.R.	E301, E305,	1.0 2.0	1/1/94	0.611
N. Review PS&E	E301, E303, E305, E307, E309, E316, E318, E320, E324,	1.0 1.0	2/1/94	
Sub-total - Final Design		145	End 3/1/94	0.128(E305)
Construction	E401, E304, E306, E308, E139,	6 5 4	Begin 3/1/94 End 11/1/95	
PROJECT TOTAL (Staff Days)				

EXAMPLE PROBLEM

PROJECT RESOURCE ESTIMATING AND TRACKING WORKSHEET

SOIL MECHANICS BUREAU

PIN PROJECT 4 Proj. Type (1-9) MAJOR NEW HIGHWAY Orig. Estimate Date / / Estimator HD&C

Proj. Desc. & Loc. SEVERAL BRIDGES, WALLS, EMB. ON SOFT SOILS W/ WAIVER ON CAISSONS Rev. Estimate Date / / Estimator HD&C

Revision No. ____ Est. Proj. Cost($M) ____

MENU OF ACTIVITIES	FUNCTION CODES	ESTIMATED EFFORT WITHIN PIN (STAFF DAYS)	DUE DATES	AVERAGE STAFF PER PHASE
SCOPING (PRE-PHASE I)			Begin 12/1/91	
A. Existing Info. review,	E301	4.0	12/15/91	
Site inspection, needs	E303	6.0		
assessment for CSSQ.	E305	6.0		0.083
	E307	2.0		
B. Obtain Prel. Subsurface	E101,	7.0	1/1/92	
Explorations & Surveys	E102,			
	E151,	15.0		
	E301,	4.0		
	E312,	10.0		
	E313,	10.0		
C. Assistance in Scoping, Scheduling & Cost Estimating for CSSQ	E301	5.0	3/1/92	
Sub-total - Scoping		69	End 4/1/92	0.083 (E301)
PRELIMINARY DESIGN (PHASE I-IV)			Begin 4/1/92	
D. Gather & Review existing	E301,	5.0	5/1/92	
site info. & site inspec.	E303,	10.0		
	E305,	10.0		0.062
	E307,	5.0		
	E309,	2.0		
	E312,	2.0		
	E313,	2.0		
	E316,			
	E318,			
	E320,			
	E342,			

MENU OF ACTIVITIES	FUNCTION CODES	ESTIMATED EFFORT WITHIN PIN (STAFF DAYS)	DUE DATES	AVERAGE STAFF PER PHASE
E. Subsurf. Explor. request & Prelim. Recommendations	E301,	2.0	5/15/92	
	E303,	25.0		
	E305,	25.0		0.154
	E307,	12.0		
	E309,	4.0		
	E316,			
	E318,			
	E320,			
	E342			
F. Review Design Report & prepare written response	E301	3.0	11/1/92	
Sub-total - Preliminary Design		107	End 1/1/93	0.216 (E30)
FINAL DESIGN (PHASES V-VI)			Begin 1/1/93	
G. Obtain final subsurface explorations & surveys	E101,	7.0		
	E102,			
	E121,	15.0		
	E124,			
	E131,	15.0		
	E135,	10.0		
	E138,			
	E139,	15.0		
	E301,	6.0		
	E312,	10.0		
	E313,	20.0		
H. Review preliminary plans, additional site inspection, & prepare written response	E301	5.0	5/1/93	
I. Progress Soil Testing	E201,	12		
	E202,	18		
	E203,			
	E204,	50		
	E206,	50		
	E207,			
	E225	5		

MENU OF ACTIVITIES	FUNCTION CODES	ESTIMATED EFFORT WITHIN PIN (STAFF DAYS)	DUE DATES	AVERAGE STAFF PER PHASE
J. Review preliminary struc. plans and subsurface expl. & progress foundation analysis & prepare FIR or fndg. report	E301, E305, E307, E309, E312, E313,	2.0 60.0 10.0 15.0 15.0	9/1/93	 0.278 0.046
K. Review preliminary plans & subsurface explorations & progress foundation analysis (with alternate solutions) & prepare fndg. report	E301, E303, E309, E316, E318, E320, E342,	4.0 120.0 	10/1/93	
L. Review ADP's & prepare written response	E301, E303, E305, E307, E309, E316, E318, E320, E342,	2.0 4.0 	11/1/93	
M. Review Final prel. structures; plans & F.D.R.	E301, E305,	2.0 5.0	12/1/93	 0.023
N. Review PS&E	E301, E303, E305, E307, E309, E316, E318, E320, E324,	 2.0 2.0 1.0 	12/15/93	 0.009
Sub-total - Final Design		475	End 1/1/94	0.356
Construction	E401, E304, E306, E308, E139,	15 10 10 4 15	Begin 1/1/94 End 11/1/95	
PROJECT TOTAL (Staff Days)				

APPENDIX 5

CHART A : TRACKING SYSTEM - SOIL MECHANICS BUREAU

CHART B: TRACKING SYSTEM - SOIL MECHANICS BUREAU SECTION

CHART C: TRACKING SYSTEM - REGIONAL SOILS SECTION DRILLING

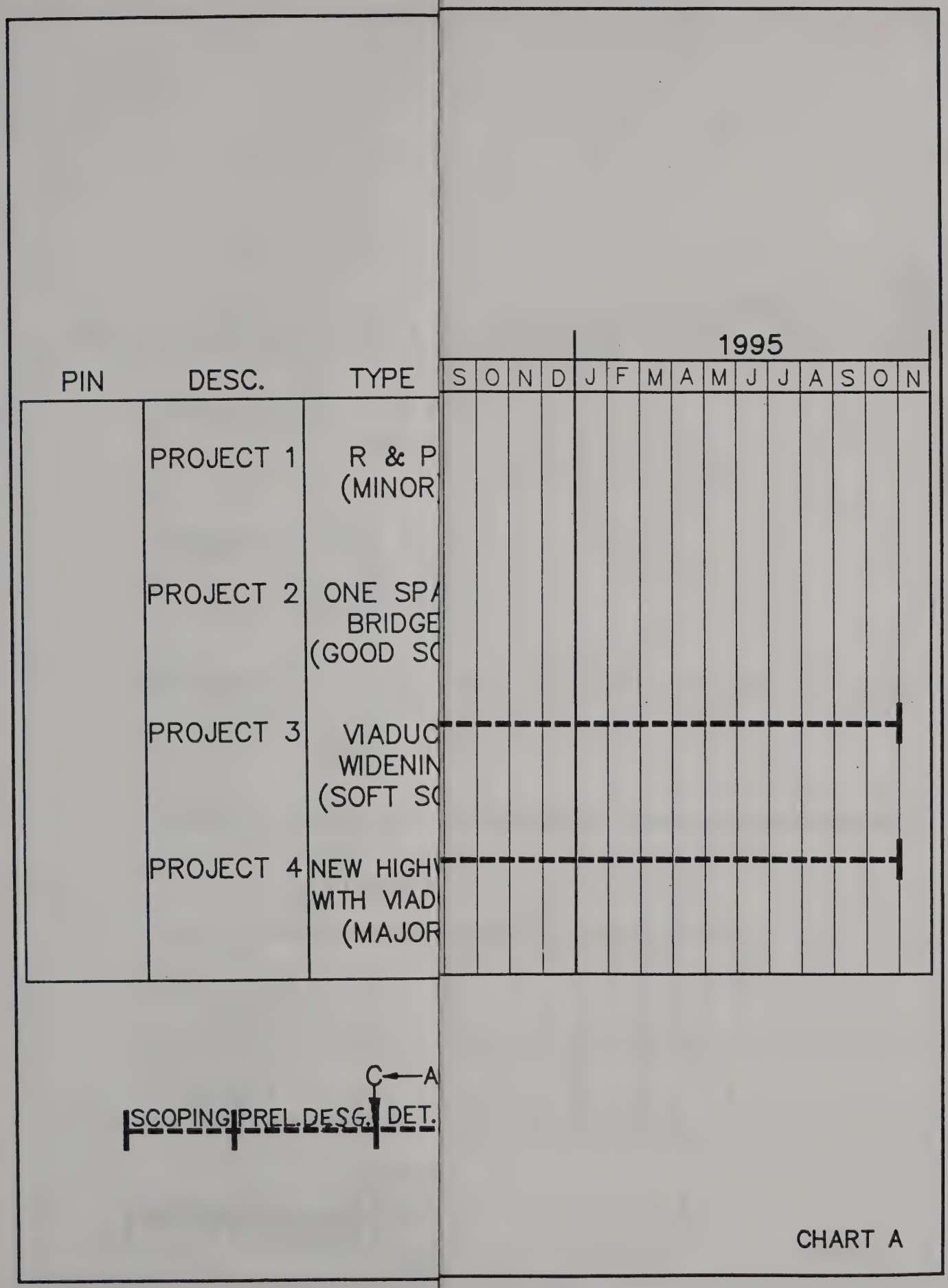
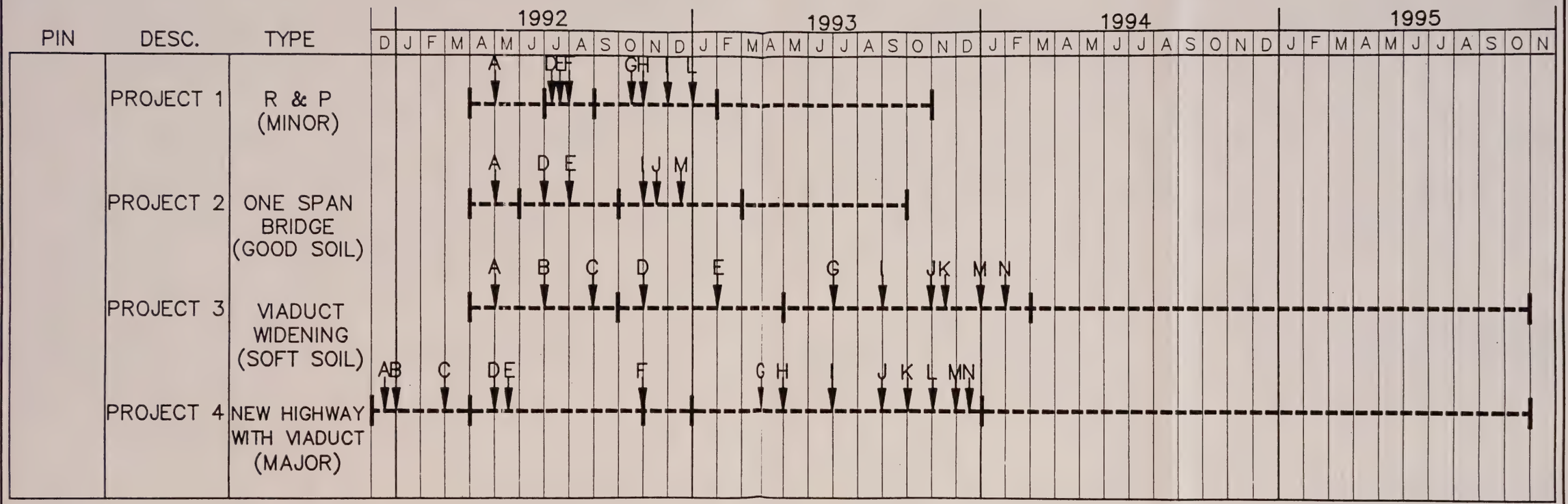

1995
PIN
DESC.
TYPE
S O N D J F M A M J J A S O N
PROJECT 1
R & P
(MINOR
PROJECT 2
ONE SPA
BRIDGE
(GOOD SC
PROJECT 3
VIADUC
WIDENIN
(SOFT SC
PROJECT 4
NEW HIGH
WITH VIAD
(MAJOR
C
A
SCOPING
PREL. DESG.
DET.

CHART A

SAMPLE PROBLEM
PROJECT SCHEDULING WORK SUMMARY
TRACKING SYSTEM
SOIL MECHANICS BUREAU
REGION 3 PROJECTS



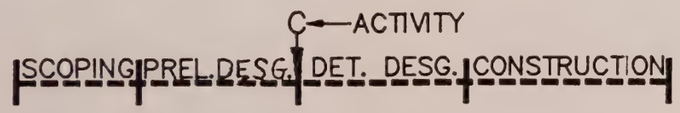
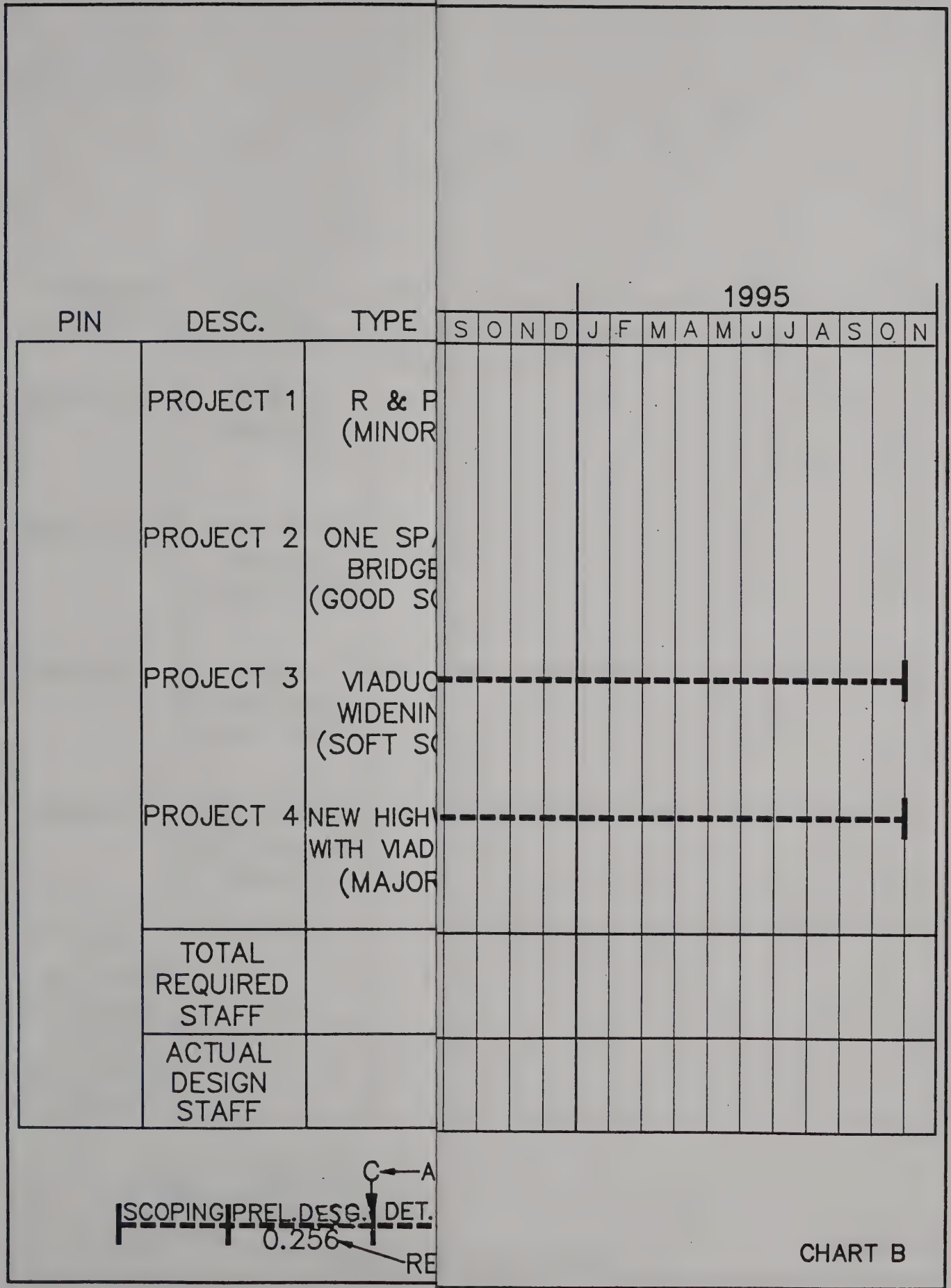


CHART A


1995
PIN
DESC.
TYPE
S O N D J F M A M J J A S O N
PROJECT 1
R & P
(MINOR
PROJECT 2
ONE SP
BRIDGE
(GOOD S
PROJECT 3
VIADUC
WIDENIN
(SOFT S
PROJECT 4
NEW HIGH
WITH VIAD
(MAJOR
TOTAL REQUIRED STAFF
ACTUAL DESIGN STAFF
C
A
SCOPING
PREL. DESG.
DET.
0.256
RE
CHART B

SAMPLE PROBLEM
PROJECT SCHEDULING WORK SUMMARY
TRACKING RESOURCE NEEDS
SMB –STRUCTURE FOUNDATION UNIT
PROJECTS STATEWIDE

PIN	DESC.	TYPE	1992 D J F M A M J J A S O N D	1993 J F M A M J J A S O N D	1994 J F M A M J J A S O N D	1995 J F M A M J J A S O N
	PROJECT 1	R & P (MINOR)	A, DEF, GH, I, L — 0, 0, 0			
	PROJECT 2	ONE SPAN BRIDGE (GOOD SOIL)	A, D, E, I, J, M — 0.014, 0.018, 0.026			
	PROJECT 3	VIADUCT WIDENING (SOFT SOIL)	A, B, C, D, E, G, I, JK, M, N — 0.023, 0.024, 0.128			
	PROJECT 4	NEW HIGHWAY WITH VIADUCT (MAJOR)	AB, C, DE, F, GH, I, J, K, L, MN — 0.083, 0.216, 0.356			
	TOTAL REQUIRED STAFF		0.257	0.484		
	ACTUAL DESIGN STAFF		5	5		

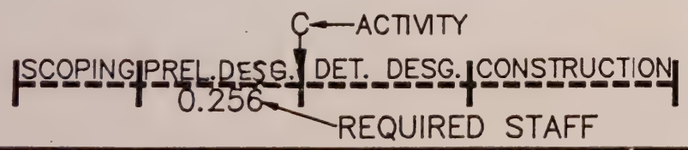


CHART B

PROJECT DESC.	TYPE	FOOT/ REQUI PREL.					1995										
			S	O	N	D	J	F	M	A	M	J	J	A	S	O	N
PROJECT 1	R & P (MINOR)	0															
PROJECT 2	ONE SPAN BRIDGE (GOOD SOIL)	0															
PROJECT 3	VIADUCT WIDENING (SOFT SOIL)	200															
PROJECT 4	NEW HIGHWAY WITH VIADUCT (MAJOR)	400															
TOTAL REQUIRED CREWS																	
ACTUAL AVAILABLE CREWS																	

P ← DURATION OF

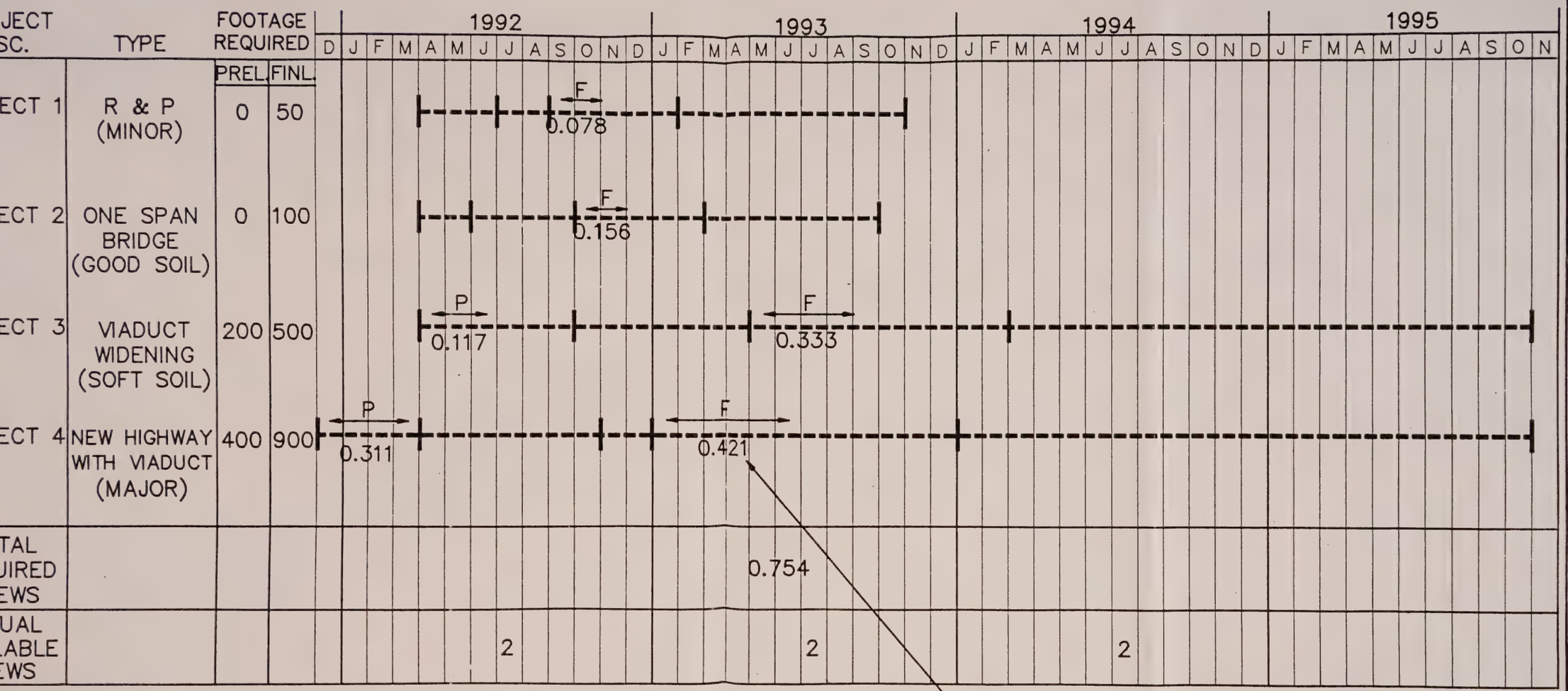
SCOPING | PREL.DESG. | DET.

0.256 ← REQUIRED DK PER CREW

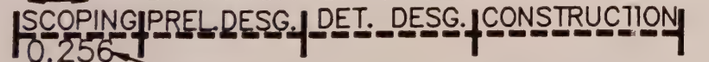
CHART C

SAMPLE PROBLEM
PROJECT SCHEDULING WORK SUMMARY
TRACKING RESOURCE NEEDS
REGIONAL SOILS SECTION – DRILLING
REGION 6

PROJECT DESC.	TYPE	FOOTAGE REQUIRED PREL.	FOOTAGE REQUIRED FINL.
PROJECT 1	R & P (MINOR)	0	50
PROJECT 2	ONE SPAN BRIDGE (GOOD SOIL)	0	100
PROJECT 3	VIADUCT WIDENING (SOFT SOIL)	200	500
PROJECT 4	NEW HIGHWAY WITH VIADUCT (MAJOR)	400	900
TOTAL REQUIRED CREWS			
ACTUAL AVAILABLE CREWS			



P ← DURATION OF PREL. OR FINAL BORINGS



REQUIRED DRILL CREWS BASED ON PRODUCTION RATE OF 100 FEET OF DRILLING PER WEEK PER CREW

$$\frac{900'}{21.4\text{WKS.}} \div \frac{100'}{\text{WK.}} = 0.421$$

CHART C

APPENDIX 6

1991 REGIONAL SOILS ENGINEERS

REGION 1 - ROBERT WINANS - (518) 454-0393

REGION 2 - MICHAEL GELFUSO - (315) 793-2484

REGION 3 - MARK CREGG - (315) 469-3236

REGION 4 - RICHARD KIEHLE - (716) 272-3396

REGION 5 - JOSEPH ZIEZIULA - (716) 649-2808

REGION 6 - WALTER GRONSKI - (607) 324-7580

REGION 7 - WILLIAM WHALEN - (315) 785-7470

REGION 8 - HERBERT LITTS - (914) 431-5753

REGION 9 - DANIEL COLEMAN - (607) 773-7845

REGION 10 - WILLIAM ARNAIZ - (516) 360-6177

REGION 11 - SUBRAMANIAN SRINIVASAN - (609) 482-4511

00344
LRI